An Overview of the Safe Drinking Water Act

Drinking Water Academy

- **Introductory modules**
  - * **Overview of the Safe Drinking Water Act**
  - – Introduction to the EPA's Source Protection Programs
  - – Introduction to the Underground Injection Control Program
  - – Introduction to the Public Water Supply Supervision Program
- Regulatory modules
- Technical modules

- The Drinking Water Academy (DWA) is developing a number of training modules. These modules cover topics identified by the DWA Workgroup as most important in supporting Safe Drinking Water Act (SDWA) implementation.
- The module is geared toward employees new to SDWA programs. Since this is an introductory module, some topics are not covered in detail. This module was developed in conjunction with three other one-day introductory modules that will provide you with a complete picture of SDWA and its programs.

Objectives

- Explain threats to drinking water
- Describe the hydrologic cycle and pathways of contamination
- Understand the history of drinking water regulation
- Describe the major SDWA programs

- This module provides an overview of the Safe Drinking Water Act. The purpose of this module is to:
  - Explain the types of threats to drinking water and the importance of protecting it to ensure good public health;
  - Describe where our drinking water comes from and how it may become contaminated;
  - Introduce the three major programs under the Act to protect drinking water supplies; and
  - Provide the history of State and local regulation of drinking water prior to the Federal SDWA and the context for SDWA and the SDWA programs.

Threats to Drinking Water

Contaminants and Health Effects

Discussion

- What contaminants pose a public health threat to your daily water?
- What are the effects of these potential health threats?

Contaminant Effects

- Acute health effects
- Chronic health effects
- Aesthetic concerns

- There are two major types of health effects—acute and chronic.
  - ***Acute health effects*** are immediate (within hours or days) effects that may result from exposure to certain contaminants such as pathogens (disease causing organisms) or nitrate that may be in drinking water.
    - ***Pathogens*** are usually associated with gastrointestinal illness and, in extreme cases, death.
    - ***Nitrate*** in drinking water also poses an acute health threat. High levels can interfere with the ability of an infant's blood to carry oxygen. This potentially fatal condition is called methemoglobinemia or "blue baby syndrome." Nitrates may also indicate the possible presence of other more serious residential or agricultural contaminants such as bacteria or pesticides.
  - ***Chronic health effects*** are the possible result of exposure over many years to a drinking water contaminant at levels above its maximum level established by EPA. Chronic health effects include birth defects, cancer, and other long-term health effects. Contaminants causing long-term health effects are mostly chemical contaminants and include, among others, byproducts of solvents used by commercial and industrial facilities, pesticides, disinfection, and lead and other metal. For example, some disinfection byproducts are toxic and some are probably carcinogens. Exposure to lead can impair the mental development of children.
- People also have ***aesthetic concerns*** about their drinking water. These are ***non-health related effects*** that render drinking water unpalatable or undesirable to use. Examples include hardness, and iron or manganese staining.

Types of Pathogens

- Viruses (e.g., Norwalk virus, rotaviruses)
- Bacteria (e.g., *Shigella, E.Coli*)
- Parasites, protozoa and cysts (e.g., *Giardia Lamblia, Cryptosporidium*)

- ***Pathogens*** are microorganisms that can cause disease in other organisms or in humans, animals and plants. They may be bacteria, viruses, or parasites and are found in sewage, in runoff from animal farms or rural areas populated with domestic and/or wild animals, and in water used for drinking and swimming. Fish and shellfish contaminated by pathogens, or the contaminated water itself, can cause serious illnesses.
  - A ***virus*** is the smallest form of microorganism capable of causing disease. A virus of fecal origin that is infectious to humans by waterborne transmission is of special concern for drinking water regulators. Many different waterborne viruses can cause gastroenteritis, including Norwalk virus, and a group of Norwalk-like viruses.
  - ***Bacteria*** are microscopic living organisms usually consisting of a single cell. Waterborne disease-causing bacteria include *E. Coli* and *Shigella*.
  - ***Protozoa*** or ***parasites*** are also single cell organisms. Examples include *Giardia Lamblia* and *Cryptosporidium*.

Protozoa

Giardia

Cryptosporidium

- *Giardia Lamblia* was only recognized as a human pathogen capable of causing waterborne disease outbreaks in the late 1970s. Its occurrence in relatively pristine water as well as waste water treatment plant effluent called into question water system definitions of “pristine” water sources. During the past 15 years, *Giardia Lamblia* has become recognized as one of the most common causes of waterborne disease in humans in the United States. This parasite is found in every region of the U.S. and throughout the world. In 1995, outbreaks in Alaska and New York were caused by *Giardia*. The outbreak of giardiasis in Alaska affected 10 people, and was associated with untreated surface water. The outbreak in New York affected an estimated 1,449 people, and was associated with surface water that was both chlorinated and filtered. The symptoms of giardiasis include diarrhea, bloating, excessive gas, and malaise.
- *Cryptosporidium* (often called “crypto”), which cannot be seen without a very powerful microscope, is so small that over 10,000 of them would fit on the period at the end of this sentence. The infectious dose for crypto is less than 10 organisms and, presumably, one organism can initiate an infection. As late as 1976 it was not known to cause disease in humans. In 1993, more than 400,000 people in Milwaukee, Wisconsin, became ill with diarrhea after drinking water contaminated with the parasite. Since then attention was focused on determining and reducing the risk of cryptosporidiosis from public water supplies. Crypto is commonly found in lakes and rivers and is highly resistant to disinfection. People with severely weakened immune systems are likely to have more severe and more persistent symptoms than healthy individuals.

Types of Contaminants Causing Chronic Health Effects

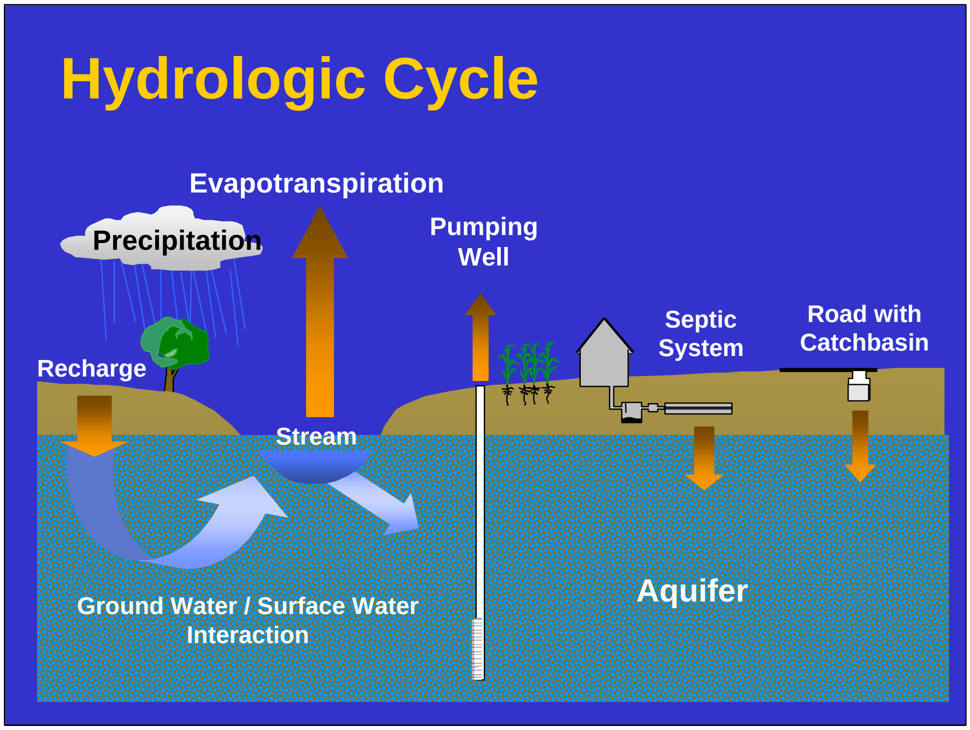
- Volatile organic contaminants (VOCs)
- Inorganic contaminants (IOCs)
- Synthetic organic contaminants (SOCs)

- Contaminants causing chronic health effects include byproducts of disinfection, lead and other metals, pesticides, and solvents used by commercial and industrial facilities.
- ***Volatile organic contaminants*** (VOCs) include mostly industrial and chemical solvents such as benzene and toluene. Benzene has the potential to cause chromosome aberrations and cancer from a lifetime exposure at levels above the MCL. Toluene has the potential to cause more pronounced nervous disorders such as spasms; tremors; impairment of speech, hearing, vision, memory, and coordination; and liver and kidney damage from a lifetime exposure at levels above the MCL.
- ***Inorganic contaminants*** (IOCs) include metals and minerals. Some of these have the potential to cause chronic health effects. For example, lead has the potential to cause stroke, kidney disease, and cancer from a lifetime exposure at levels above the MCL.
- ***Synthetic organic contaminants*** (SOCs) include pesticides such as atrazine and alachlor. Atrazine has the potential to cause weight loss; cardiovascular damage; retinal and some muscle degeneration; and cancer from a lifetime exposure at levels above the MCL. Alachlor can cause eye, liver, kidney, or spleen problems; anemia; and an increased risk of cancer.

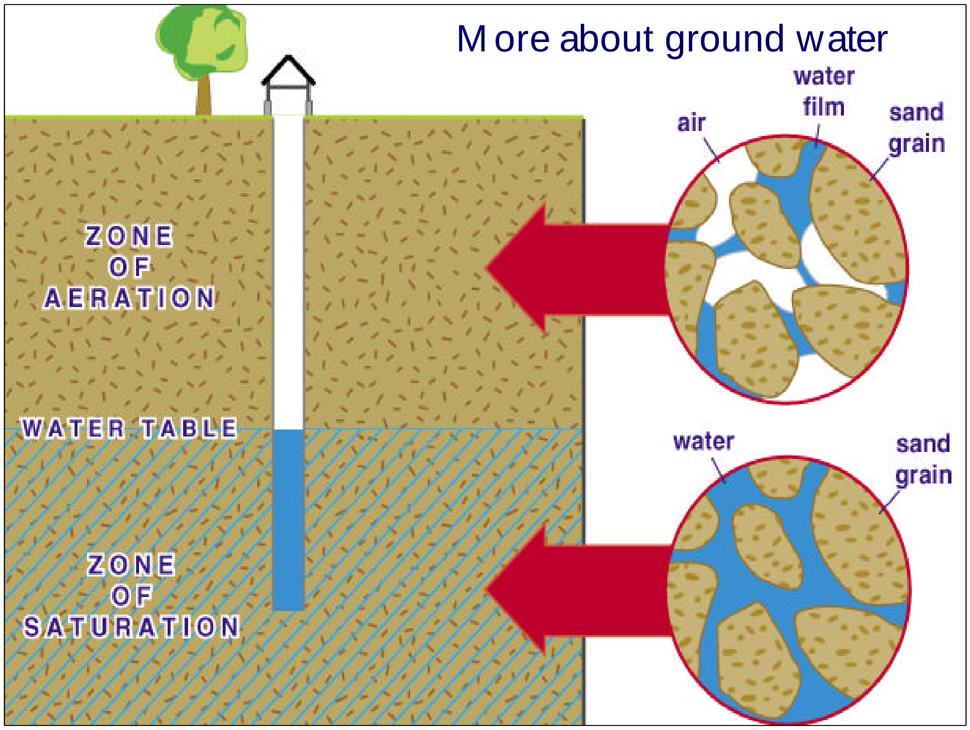
Discussion

- Where do microbiological and chemical contaminants come from?

The Hydrologic Cycle, Sources of Drinking Water, and Pathways of Contamination



- There is a ***finite amount of water on the earth***. The water on the earth is used over and over again. The water cycle, or hydrologic cycle, is the continuous movement of water from ocean to air and land then back to the ocean in a cyclic pattern.
  - The sun heats the Earth's surface water (lakes, rivers, oceans, estuaries) which causes it to ***evaporate***.
  - The water vapor rises into the Earth's atmosphere where it cools and condenses into liquid droplets.
  - The liquid droplets combine and grow until they become too heavy and fall to the Earth as precipitation. ***Precipitation*** falls from the atmosphere in the form of rain, ice, or snow. It reaches the land surface and recharges rivers, lakes, and other surface water bodies directly; ***infiltrates*** the ground and eventually reaches the ***ground water***; or evaporates back into the atmosphere.
  - Throughout the cycle, water is temporarily stored in lakes, glaciers, underground, or in living organisms.
- Water that exists beneath the land surface is called ***ground water*** while water at the surface is called ***surface water***.
- Pumping wells are used to extract ground water for use at the surface. A pumping well near a stream or lake may draw water from the stream or lake into the ground water and subsequently into a drinking water supply well. Water may also transfer from surface water to the aquifer by direct infiltration (known as ground water under the direct influence of surface water) through the bottom of a water body. The reverse can also occur as ground water migrates toward and recharges surface water bodies.
- ***The inter-relationship between ground water and surface water means that contamination can migrate between the two.***



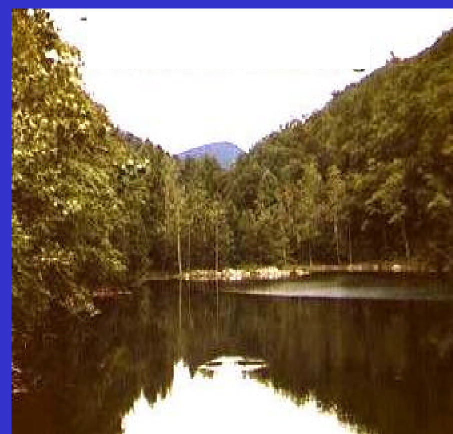
- The surface of the earth is either wet (oceans, lakes, swamps) or dry (terra firma, dry land). On land, water exists at some depth below land surface, from 2 inches (e.g., in south Louisiana) to 600 feet (e.g., in the Mojave desert).
- Water that falls on land in the form of precipitation may run off or seep into the soil. The precipitation that seeps into the ground enters the ***zone of aeration*** or the ***vadose zone***, which is directly below the surface and contains some water. In the vadose zone, water and air fill the void between soil or rock particles.
- Deeper in the ground the voids between soil or rock particles are saturated with water (not air and water). This is the ***zone of saturation.***
- ***Aquifers*** are in the zone of saturation***.*** An ***aquifer is a geologic formation where water collects in quantities sufficient to support a well or spring***; it may be only a few miles wide, or it may span the borders of many States.
- The point where the zone of aeration (vadose zone) meets the zone of saturation (aquifer) is known as the ***water table***. The depth to the water table is ***unique to each geologic region***.
- Surface water is essentially those places where the water table meets the surface of the land.

Discussion

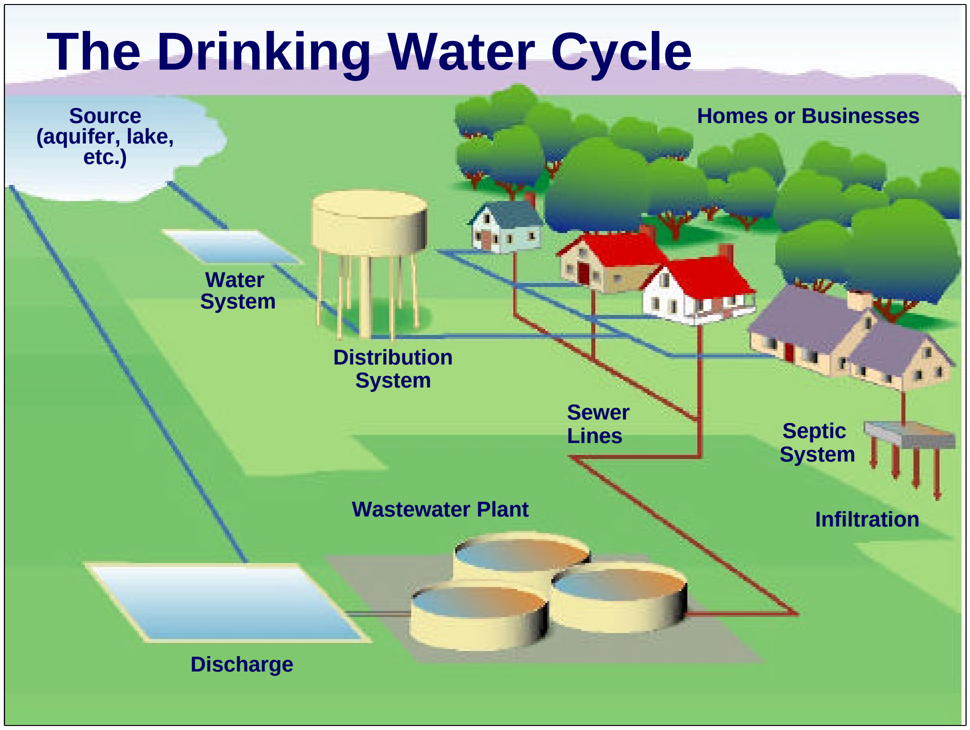
- Name as many sources of drinking water as possible

Sources of Drinking Water

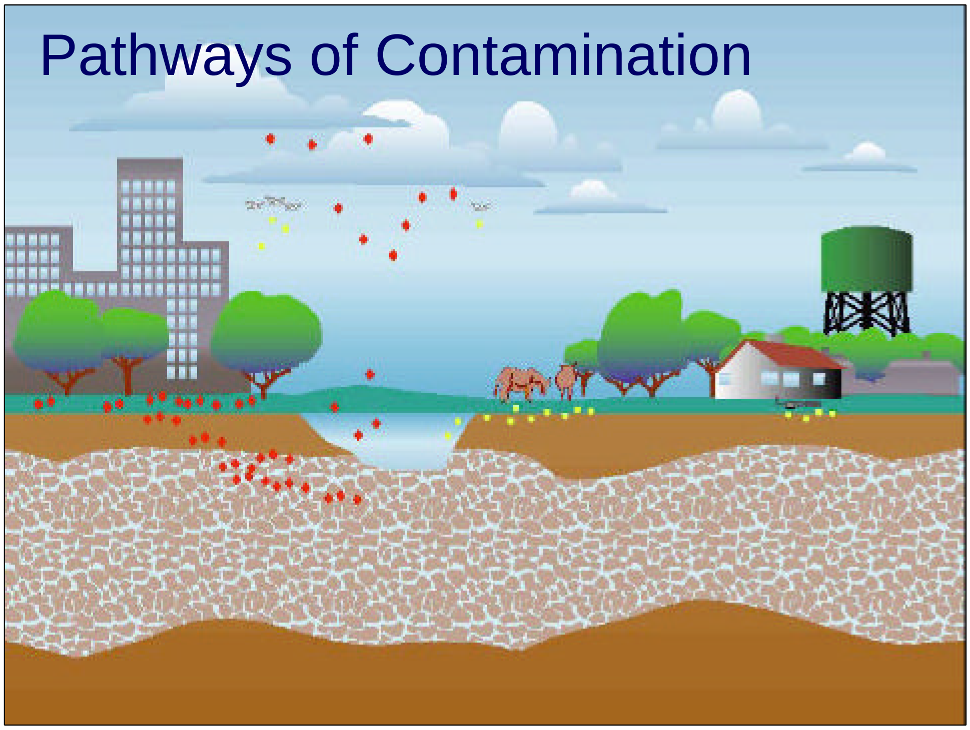
- Surface water
- Ground water
- Ground water under the direct influence of surface water
- Desalinated sea water
- Rain water



- Both surface water and ground water are used as drinking water sources. ***Surface water*** is taken from above-ground sources such as rivers, lakes, wetlands, or estuaries. ***Ground water*** is pumped from underground aquifers through drilled wells or from springs.
- Ground water from shallow aquifers, from aquifers near surface water sources, or from sources not well-protected through the natural geology may be subject to influence from surface water sources. This ground water may have characteristics commonly associated with surface water (e.g., presence of large microbiological contaminants such as cysts). ***Such ground water is defined as ground water under the influence of surface water and is regulated like surface water***.
- In some areas, the only available source of drinking water is ***desalinated sea water or rain water***.
- Access to high-quality source water helps protect the safety of drinking water and helps limit the need for expensive treatment.



- On average, our society uses almost 100 gallons of drinking water per person per day. Traditionally, water use rates are described in units of gallons per capita per day (gpcd), gallons used by one person in one day. Of the drinking water supplied by public water systems, only a small portion is actually used for drinking. As residential water consumers, we use most water for other purposes, such as flushing toilets, bathing, cooking, cleaning, and watering lawns.
- A public water system (defined in detail later in this module) takes water from a source, treats it (if necessary), and distributes the water to you. After you use the water, it goes down your drain, into your lawn, down your toilet, etc. When it leaves your house through a pipe (toilet, drain) the water goes to the sewer or a septic system. If the water flows from your house to a sewer system, the wastewater flows through the sewer to a wastewater treatment plant, is treated, and discharged or sent for reuse. If water flows from your house to a septic system, the wastewater flows to a septic tank (where some contaminants settle out of the wastewater and are stored in the tank) and then to a drainfield where wastewater percolates through the soil to ground water. The soil serves as a type of treatment for the wastewater because some contaminants attenuate in the soil.
- For those that use well water, the graphic is similar except that the water system would be an individual well.



- The contaminants described at the beginning of this module are of concern when they contaminate sources used for drinking water.
- Surface water is often a source of disease-causing organisms because it is open to the air. Animal and human waste (represented by the yellow circles) may easily contaminate surface water. In addition, surface water is vulnerable to chemical contamination (represented by the red diamonds). Chemical and microbiological contaminants may enter surface water through runoff, or through direct disposal into rivers or streams; acid rain may contaminate surface water sources; and contaminated ground water may interact with surface water and spread contamination. Surface water is vulnerable to both chemical and microbiological contamination and requires treatment before it is safe to drink.
- Ground water, which is protected by layers of soil and other subsurface materials, sometimes does not require treatment. However, ground water can become contaminated through infiltration from the surface, injection of contaminants, or by naturally occurring substances in the soil or rock through which it flows. In many cases, ground water should be disinfected before it is used as drinking water to reduce the risk of microbiological contamination. In addition, ground water is vulnerable to nitrate contamination, particularly in agricultural areas or areas with large numbers of septic tanks since both agriculture and septic tanks discharge nitrate. Nitrate does not tend to attenuate in soil and therefore moves quickly through ground water.
- Ground water under the direct influence of surface water (GWUDI) is water beneath the surface of the ground with: 1) significant occurrence of insects or other macroorganisms, algae, or large-diameter pathogens such as Giardia lamblia, or 2) significant and relatively rapid shifts in water characteristics such as turbidity, temperature, conductivity, or pH that closely correlate to climatological or surface water conditions. GWUDI faces the same risks as surface water and the same precautions should be taken before using GWUDI as a drinking water source.

Design A Regulatory Structure

A Group Exercise

How Would You Protect Drinking Water?

- We have described contaminants, their health effects, and sources of drinking water
- Now, it is your turn…

History Part 1
Before 1974

Drinking Water Concerns: Early Evidence

~ 300 BC: Hippocrates: boil and strain rain water

1846: Chlorination to prevent "child bed fever"

1854: Cholera tied to contamination of a well

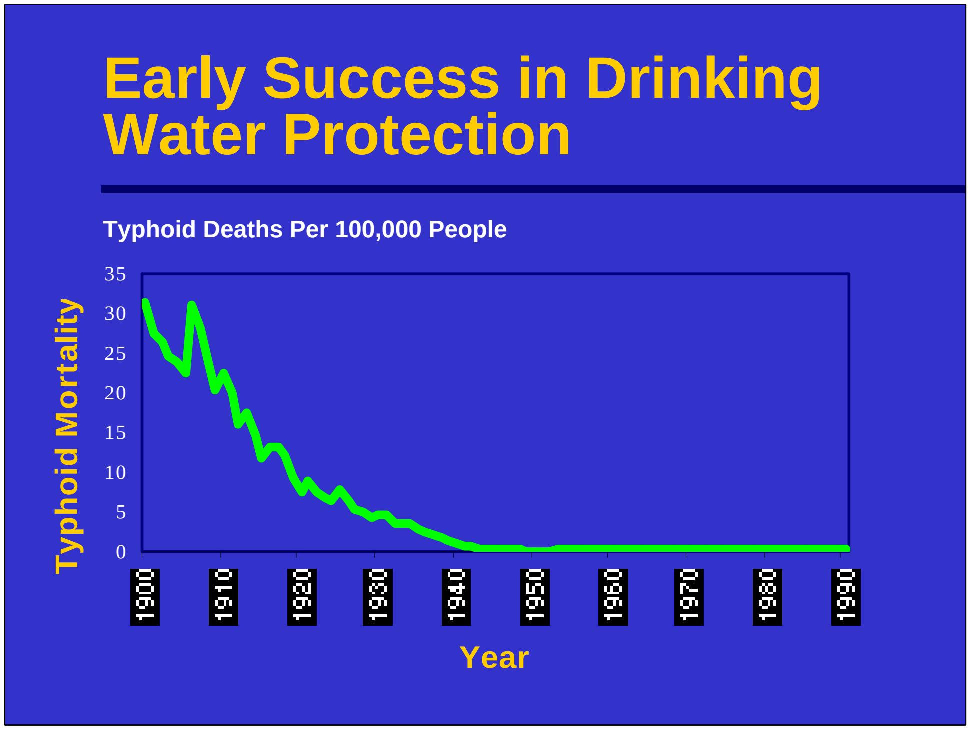
~ 1900: Typhoid tied to contaminated water

- People have long recognized the relationship between contaminated water supplies and disease outbreaks. For example, in the 4th century B.C., Hippocrates advised citizens to ***boil and strain water*** before drinking it to prevent hoarseness.
- In the mid-1800s, authorities began to recognize and address public health concerns related to drinking water. One of the earliest uses of ***chlorination*** is reported in the maternity ward of a Vienna, Austria, hospital, where it was used to prevent "child bed fever." Authorities began to print stories about these public health concerns, raising public awareness. In 1854, 616 ***cholera deaths were blamed on a drinking water well*** contaminated with human sewage.
- In the 1860s Louis Pasteur first postulated the germ theory of disease. The theory was proven by Robert Koch in Europe in the late 1800s. In the United States in the late 1800s, cities recognized the relationship between typhoid fever outbreaks and the use of untreated surface water as drinking water. However, it was not until the germ theory of disease was broadly accepted in the early 1900s that treatment of water (to mitigate disease spread through untreated water) began on a significant level.
- As population concentrated in cities in the late 1800s, the predominance of people using wells as sources of drinking water changed to a greater dependence on drinking water delivered by a community water systems from rivers and lakes.

Early 1900s: Regulating a Local Health Issue

- State and county water programs emerged in early 1900s
- Drinking water protection
  - 1906:filtration in Philadelphia
  - 1908:large-scale chlorination

- In the early 1900s, reacting to the large number of typhoid and other disease outbreaks, States and local governments began establishing public health programs to protect water supplies. The first were ***water pollution control programs,*** which focused on keeping surface water supplies safe by identifying and limiting sources of contamination. Early water pollution control programs concentrated on keeping raw sewage out of surface waters used for drinking water.
- Early ***drinking water programs*** were aimed at providing safe and adequate drinking water to a community. At first, these programs were not separate from the water pollution control programs since they also focused on identifying and maintaining safe sources of drinking water. For example, efforts were made to site intakes used to collect drinking water upstream from sewage discharges.
- Treatment of drinking water also began in the early 1900s, most notably in cities with above-average numbers of typhoid outbreaks, such as Philadelphia. The earliest treatment provided disinfection and sometimes filtration of surface water sources.

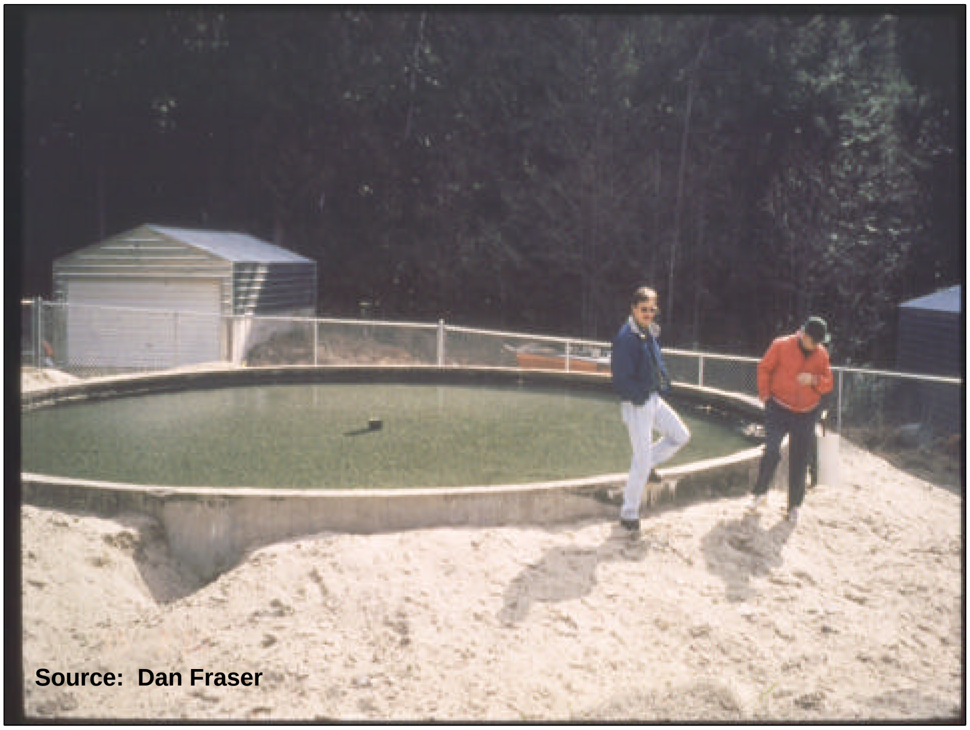


- Typhoid deaths dropped rapidly with the advent of widespread water quality and drinking water programs at the State and local levels in the early 1900s. In particular, chlorination and slow and rapid sand filtration had a significant impact.
- For example, in Albany, New York, prior to filtration of the public water supply in 1899, the typhoid death rate was 110 per 100,000. From 1900 to 1910 filtration was used and the typhoid death rate dropped to 20 per 100,000. In 1910, chlorination was introduced and the typhoid death rate for 1924 to 1929 dropped to zero.
- On a national scale, the percentage of individuals who died from typhoid fever in 1910 is similar to the percentage of people who die in car accidents today.

Early Treatment and Monitoring Techniques

- Disinfection
  - Chlorination
- Slow sand filtration
  - Large filter beds with relatively slow filtration rate, no chemical coagulation
  - Removal by sieving and “scavenging”

- Early treatment systems were relatively simple and were based on many factors such as land availability, quality of raw water and the then current understanding of causes of waterborne disease.
- Disinfection through chlorination was known to reduce microbials in water. Slow sand filtration was conducted in large beds of sand that had relatively slow filtration rates. In the slow sand process, a biological “skin” is formed in the first one - two inches of sand. Removal of particulates and pathogens is accomplished by sieving and scavenging by predatory organisms as water filters slowly through the sand.



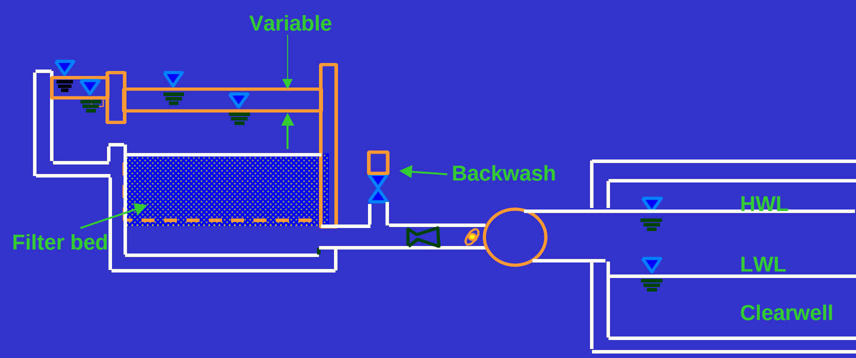
- This slow sand filter is located on high quality surface water in northern Idaho. The operator simply has to periodically clean the top layer of sand and has no complicated process controls to deal with. These kinds of filters are very good for small water systems that have very high quality (low turbidity and color) surface waters.

Early Treatment and Monitoring Techniques (continued)

- Rapid sand filtration
  - Smaller filter beds with more rapid filtration rate, some chemical coagulation
  - Relies on destabilization and attachment for removal
- Water quality monitoring
  - Total coliform monitoring
  - Jackson Candle turbidity measurement

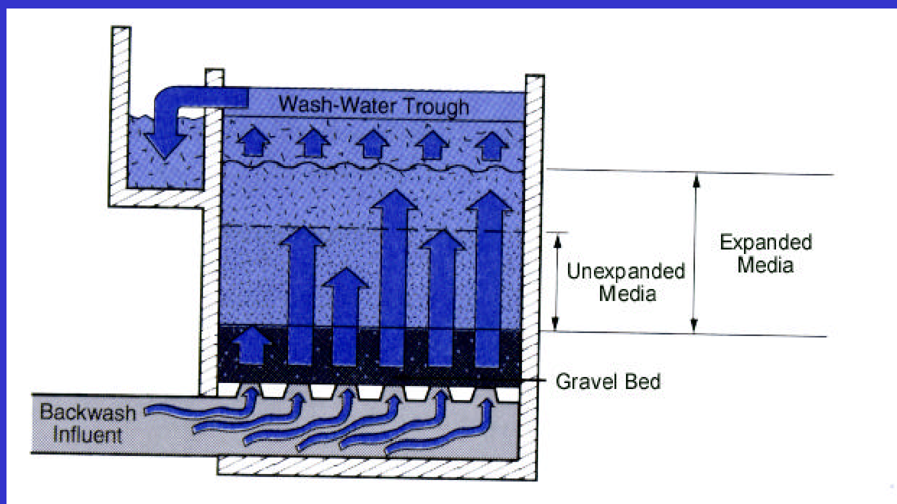
- Rapid sand filtration was also used as a technique to remove pathogens. In this process, smaller filter beds with more rapid filtration rates are used. Particulates and pathogens are removed by a chemical process that destabilizes the particles, thus allowing them to agglomerate and ultimately attach to filter grains as the water moves through the filter media.
- Monitoring methods during this time period focused on removal of turbidity (cloudiness) of water as measured with a Jackson Candle Instrument. Bacteriological quality was indicated by water sample analysis for *E. Coli*.
- Until the middle of the 20th century, life expectancy was still no more than 50 years. Preventive measures for avoiding infectious disease were developing, but were still in an early stage.

Constant Rate Filtration
(Flow meter & flow modulation valve)



- This is a common gullet with the same water level on each filter. The water level varies, but the levels on the filters move up and down in unison (constant rate, constant head). The rate of filtration is controlled with a rate-of-flow controller. When a filters gets dirty and there is more headloss through it, the rate-of-flow control valve opens more and lets more water through.
- One should look for a downstream rate-of-flow controller and observe it to see if it appears to be functioning properly, that is, not visibly oscillating and allowing surges of water through the filter. When these types of filters are operating properly, they do not allow surges.
- There are also constant rate, variable head filters where the flow is split to each filter through independent gullets.

Conventional Filter Backwash



- To clean the filter, the media grains must be agitated to dislodge the sticky coating and particles that have attached during the filtration process. Sometimes surface wash or air scour is used to assist in the agitation.
- Observe the following:
  - During backwash is the flow routed to the remaining filters, overloading them?
  - Are there isolated “boils” during the process?
  - Is there excessive air displacement throughout the backwash?
  - Are there areas that do not clean visually or take a long time to clean?

Early State Regulation Example: Montana

- Montana enacted a public water supply statute about 1907
- The legislature weakened the statute in 1911
- Two major typhoid outbreaks with several deaths resulted in amending the statute to its original form

- Montana’s statute provided source water protection. It required treatment of discharges of wastewater to sources of drinking water or ice prior to discharge.
- Cities and industries complained about the costs and the legislature amended the Act in 1911 to force the Board of Health to prove there was a problem before treatment could be required.
- Subsequently, two major outbreaks of typhoid convinced the legislature that prevention was a better policy, and the Act was amended to its original form.

First Federal Oversight

- Aimed at navigable rivers and interstate carriers, not water treatment:
  - 1899: Rivers and Harbors Act addressed discharges to navigable waters
  - 1912: Public Health Service "common cup" standards
  - 1914: Public Health Service drinking water standards for interstate carriers

- After the Civil War, the ***Public Health Service***, which was originally established under the Office of the Surgeon General, began to study illnesses associated with contaminated drinking water. However, early Federal laws were limited to activities that State laws could not address, primarily ***interstate commerce.***
- The ***Rivers and Harbors Act of 1899*** applied primarily to discharges that would interfere with navigation such as mine tailings, rocks, or other objects.
- The Interstate Quarantine Act provided Federal authority to establish drinking water regulations to prevent the spread of disease from foreign countries to the States or from State to State.
  - This resulted in promulgation of the first interstate quarantine regulations in 1894.
  - The first water-related regulation, adopted in 1912, prohibited the use of the common cup on carriers of interstate commerce, such as trains.
- In 1914, the Public Health Service established the first Federal drinking water standards. The standards applied to water supplied to interstate carriers--primarily passenger trains.
  - The standards included a 100/cc (100 organisms/mL) limit for total bacterial plate count. Further they stipulated not more than one of five 10 cc portions of each sample examined could contain *B. coli* (now called *E. coli*).
  - The standards were legally binding only on water supplies used by interstate carriers, but many State and local governments adopted them as guidelines.

Expanded State Regulatory Programs

- Multiple barrier approach
  - Source selection and protection
  - Treatment
  - Distribution
- Plans and specifications for water systems
- Sanitary surveys

- By the mid-1900s, State public health departments were well-established regulatory agencies. The primary contaminants of concern were microbes, and States used a "***multiple barrier approach***" to prevent microbial contamination of drinking water.
  - The first barrier was the ***selection and protection of an appropriate source***. For surface water sources, this meant locating and constructing water intakes to ensure little or no contamination from fecal bacteria. For ground water sources, this meant constructing wells in appropriate locations, at appropriate depths, and with approved construction methods (e.g., casing and grouting).
  - The second barrier, ***treatment***, was selected to be appropriate to the quality of the source water. Treatment was designed to eliminate all contaminants of concern identified during testing of source water. Under the umbrella of treatment, there were multiple barriers. For example, settling, filtration, and disinfection may all be used to treat the same water for different constituents.
  - The third barrier was ***distribution***. Here, the State agencies understood the importance of well-engineered distribution systems that would promote full circulation and avoid stagnant water conditions that might facilitate microbial contamination. The integrity of distribution systems was periodically checked to avoid any type of cross-connection whereby untreated or contaminated water might enter the system. State agencies insisted on well-engineered and constructed storage facilities that reliably protected finished water from contamination.
- States used several regulatory methods to implement the multiple barriers approach. Most required that ***plans and specifications*** for new water systems (or major alterations to existing systems) be approved prior to construction. Some States also required a post-construction inspection to ensure that "as-built" systems conformed to the approved plans and specifications. In addition, routine ***sanitary surveys*** were conducted by a State sanitarian or engineer who checked all components of the system from source to tap.

- Between the early and mid-1900s, innovations in science and technology advanced industrialization. During the past 50 years, the increased use of chemicals caused scientists to be concerned not only about microbial contaminants in drinking water, but also chemical contaminants. Scientists began to identify health risks associated with a number of contaminants. For example:
  - Many industrial plants discharged ***heavy metals*** and ***volatile organic compounds*** (VOCs) directly into streams or injected them into the subsurface through wells.
  - Plants that were designed to produce toxic chemicals for military use were, after World War II, converted for pesticide production; pesticide use became widespread. By the 1960's these contaminants were causing problems, as noted in Rachel Carson's ***Silent Spring***. The ***nitrates*** and ***phosphates*** in fertilizers and the ***synthetic organic compounds*** (SOCs) in pesticides and fertilizers also made their way into streams and ground water as by-products of agricultural applications.
  - With the advent of the atomic age, concerns about ***radionuclide*** contamination emerged, both from man-made sources, such as nuclear power plants, and from natural sources of radiation.

First Federal Water Programs

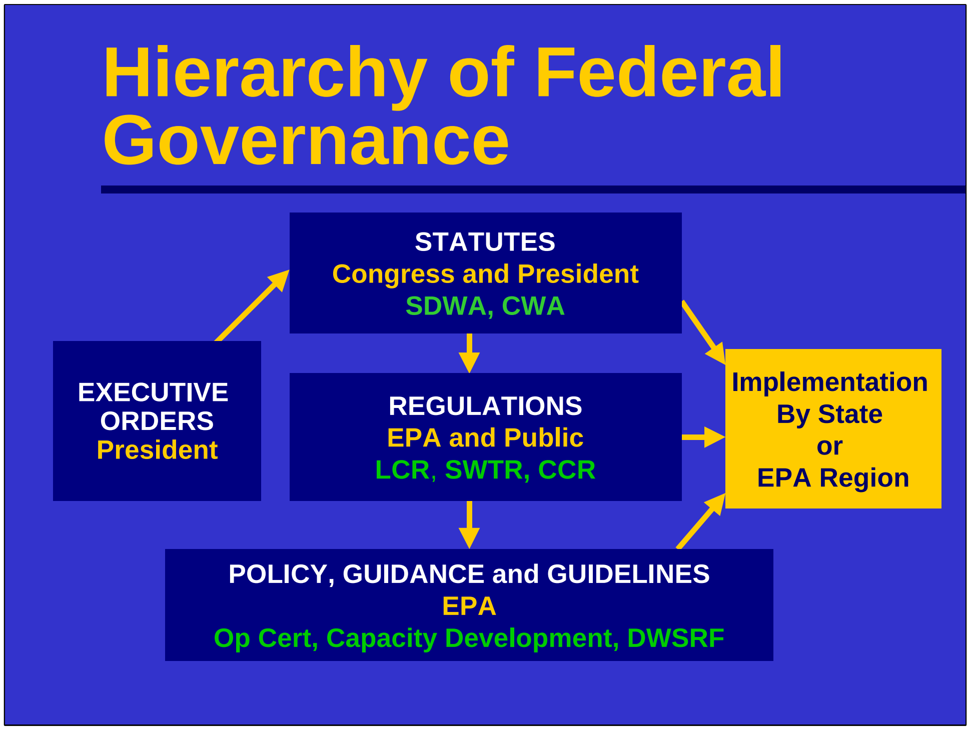
- Public Health Service
  - Ground water protection and chemical pollution
  - Studies and funding
- Indian Health Service
  - Water and wastewater facilities
- Federal statutes
  - Water Pollution Control Act of 1948
  - Federal Water Pollution Control Act of 1956
  - Water Quality Act of 1965

- During the late 1940s, the Federal government initiated additional programs to increase the public's access to safe and adequate drinking water and sewage facilities.
  - The ***Public Health Service*** began focusing on ground water protection and chemical pollution. It had little statutory authority, but carried out extensive research projects.
  - The ***Indian Health Service*** was created within the Department of Health, Education, and Welfare as part of the Public Health Service. Its mission included building water and sewage treatment facilities on Indian reservations.
- The ***Water Pollution Control Act of 1948*** funded research support for States, and the ***Federal Water Pollution Control Act of 1956*** initiated the Construction Grants Program to finance construction of publicly owned treatment works to collect and treat communities' sewage. The ***Water Quality Act of 1965*** required that States review, establish, and revise water quality standards.
- These early Federal programs provided virtually no Federal enforcement authority.

EPA Established

- EPA was established as an independent agency on December 2, 1970
- Drinking water program moved from Public Health Service to EPA
- First inventory of community water systems conducted

- In 1970, the ***Environmental Protection Agency (EPA)*** was established. The drinking water, air pollution control, and solid waste programs were moved from the Public Health Service to EPA. Water pollution control moved from the Federal Water Pollution Control Administration within the Department of Interior to EPA.
- EPA conducted the first inventory of community water systems in 1976. The inventory revealed the previous estimate of 20,000 community water systems in the U.S. was low. The survey revealed that the vast majority of systems are small and privately owned, but most people are customers of large publicly owned systems.



- ***Statutes*** - A statute is enacted by Congress, and signed by the President, or in the case of a veto by the President, is approved by a two-thirds majority of Congress. Examples of statutes include the Safe Drinking Water Act and the Clean Water Act.
- ***Executive Orders*** - Executive Orders are official documents, through which the President of the United States manages the operations of the Federal government. For example, E.O. 13045 established that, "to the extent permitted by law and appropriate, and consistent with the agency's mission, each Federal agency shall make it a high priority to identify and assess environmental health risks and safety risks that may disproportionately affect children; and shall ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks."
- ***Regulations*** - Regulations (or rules) are developed by Federal agencies to implement Federal statutes. They are legally enforceable. EPA establishes regulations that provide greater detail and prescription than the statute on which they are based, but they cannot conflict with the statute. For example, the Lead and Copper Rule (LCR), the Surface Water Treatment Rule (SWTR), and the Consumer Confidence Reports Rule (CCR) were established under the authority of the SDWA. Regulations are developed by EPA with input from the public. Regulations are published in the Federal Register and codified in the ***Code of Federal Regulations (CFR)***. Environmental regulations can be found in Title 40 of the CFR (40 CFR).
- ***Policy, guidance and guidelines*** - EPA develops policies, guidance and guidelines to provide recommendations on how to implement requirements. EPA develops policies, guidance and guidelines internally, but often consults with the Office of Management and Budget and, as a matter of practice, also consults with stakeholders.
- States have similar hierarchies.

History Part 2
SDWA 1974-1986

Safe Drinking Water Act 1974

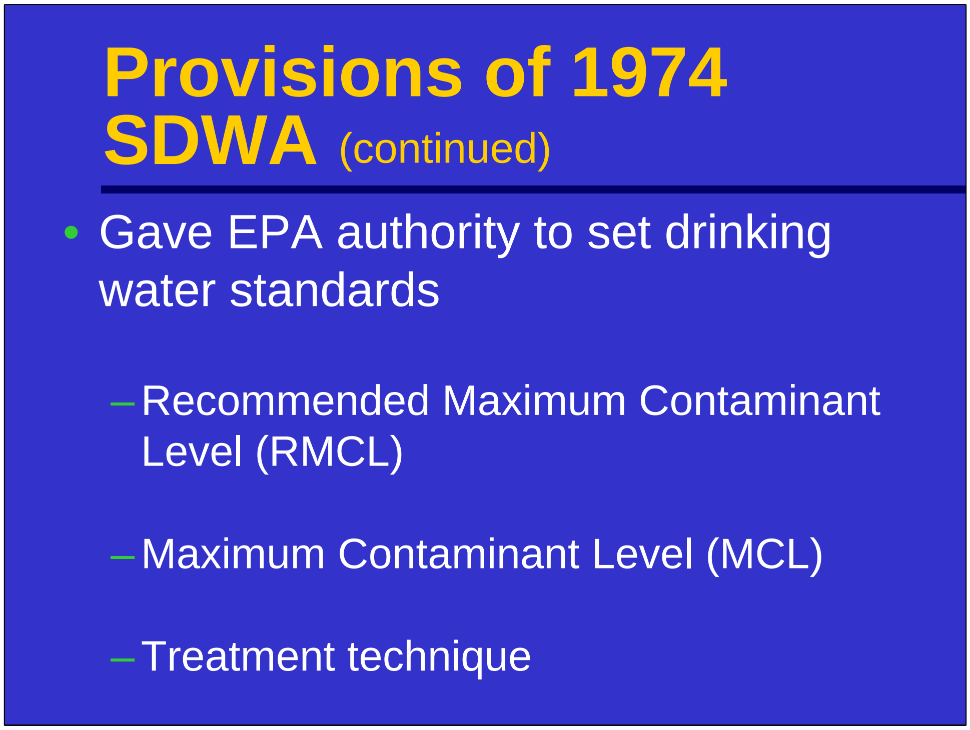
- Impetus for passage
  - National surveys
  - Increased concern and awareness
- Purpose
  - Establish national enforceable standards
  - Require water systems to monitor to ensure compliance

- In the late 1960s and early 1970s, several surveys of drinking water quality were conducted. These surveys raised concerns and prompted EPA to conduct a national survey to detail the quality of drinking water.
  - The survey showed that drinking water was widely contaminated on a national scale, particularly with synthetic organic chemicals. Contamination was especially alarming in large cities.
  - This survey raised concerns about drinking water in the public health community and in the general public. ***Increased concern and awareness of contamination of drinking water supplies prompted Congress to enact the Safe Drinking Water Act (SDWA) in 1974***.
- The ***purpose of SDWA*** is to establish national enforceable standards for drinking water quality and to guarantee that water suppliers monitor water to ensure that it meets national standards.

Provisions of 1974 SDWA

- EPA to promulgate National Primary Drinking Water Regulations
- Established the Public Water System Supervision (PWSS), Underground Injection Control (UIC), and Sole Source Aquifer programs
- Provided for State implementation (primacy)

- Congress enacted the Safe Drinking Water Act in 1974. The 1974 SDWA restructured drinking water programs in two significant ways.
  - First, it set up a higher level of responsibility for regulating drinking water systems than established State programs: a newly formed Federal program, called the Public Water System Supervision Program (PWSS).
  - Second, it shifted the focus from water system planning and prevention of contamination, to include developing standards, monitoring for contaminants, and taking enforcement action.
  - Federal law required the development of Federal regulations. However the law realized that protection of drinking water was still primarily a State responsibility. SDWA included a major focus on delegating primary responsibility for program implementation (i.e, primacy).



- ***National Interim Drinking Water Regulations*** established either the maximum concentration of pollutants allowed in or the minimum treatment required for water that is delivered to customers. (These were renamed National Primary Drinking Water Standards in the 1986 SDWA amendments.)
- A ***Recommended Maximum Contaminant Level*** (RMCL) is the maximum level of a contaminant in drinking water at which no known or anticipated adverse health effects would occur. The 1986 amendments renamed these Maximum Contaminant Level Goals (MCLGs). MCLGs are not enforceable.
- A ***Maximum Contaminant Level*** (MCL) is enforceable. It is the maximum permissible level of a contaminant in water that can be delivered to any user of a public water system. An MCL is set as close to an MCLG as possible, taking into account the costs and benefits and feasible technologies.
- For some contaminants, there is not a reliable method that is economically and technologically feasible to measure the contaminant, particularly at low concentrations. In these cases, EPA establishes a ***treatment technique***. A treatment technique is an enforceable procedure or level of technological performance that public water systems must follow to ensure control of a contaminant.
- The hazardous waste and Superfund programs also use MCLs to define acceptable cleanup levels for contaminated water.

Provisions of 1974 SDWA (continued)

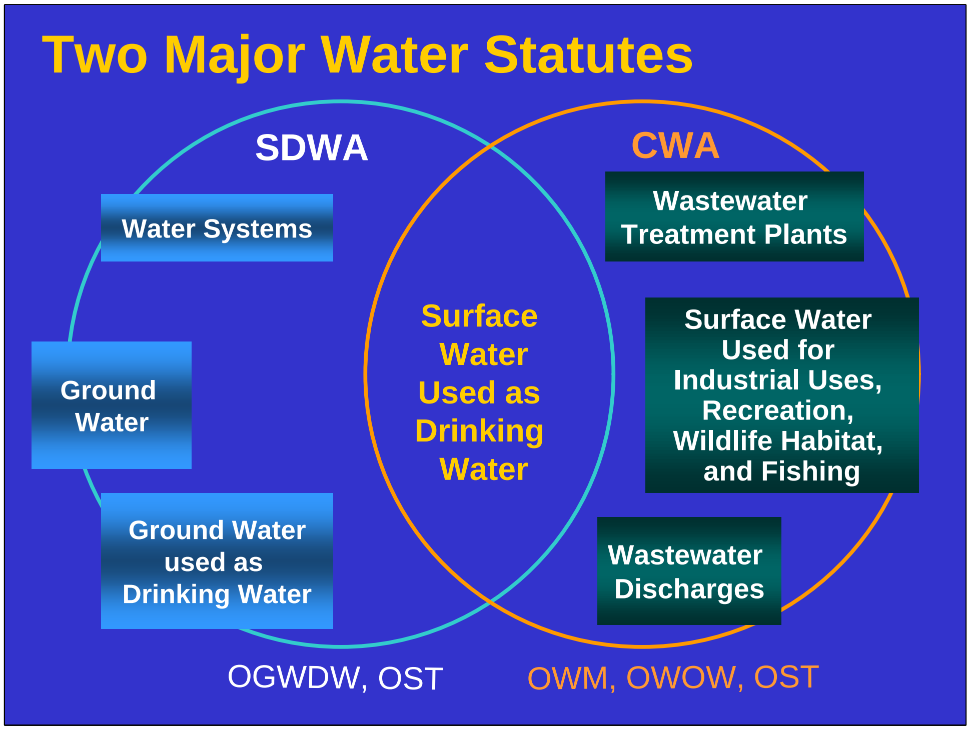
- Established three programs:
  - Public water system supervision (PWSS)
  - Underground injection control (UIC)
  - Sole source aquifer (SSA)

- The PWSS program implements the ***National Primary Drinking Water Regulations***, which can be found in 40 CFR Part 141. The PWSS program also implements programs to enhance water system operation. (The DWA module, Introduction to the PWSS Program, provides more information on this program.)
- The ***Underground Injection Control Program*** (UIC) regulates discharges of fluids into underground sources of drinking water. The Act provides EPA with the authority to limit the concentrations of contaminants discharged by wells or to close wells that endanger drinking water sources. From 1974 until 1986, the UIC program was EPA's major tool for protecting ground water resources. Today, injection into the subsurface is one of the primary means of disposing of liquid wastes. Nationwide, over 1.2 million wells are used for disposal of hazardous and nonhazardous wastes. (The DWA module, Introduction to the UIC Program, provides more information on this program.)
- The ***Sole Source Aquifer Program*** provides special status to aquifers that represent the primary source of drinking water in a particular area. Such designation gives EPA the ability to review and comment on Federally funded projects, which results in project design and practices that focus greater attention on ground water protection. (More information on this program is provided in the DWA module, Introduction to EPA's Source Protection Programs.)

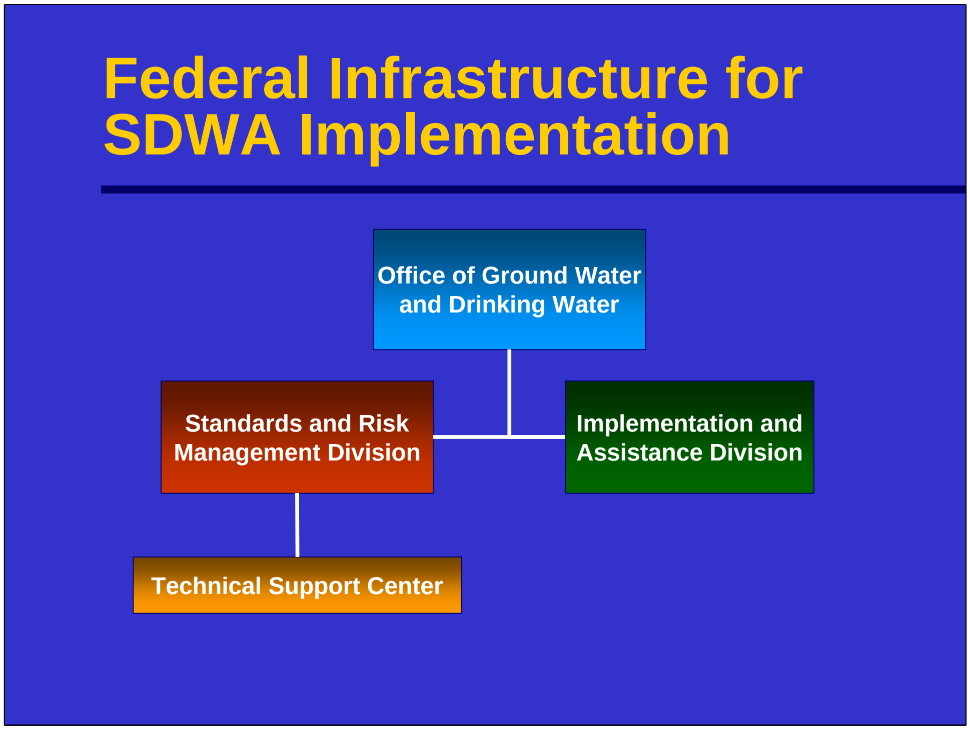
Provisions of 1974 SDWA (continued)

- Concept of "primacy"
  - Established requirements for State program delegation

- SDWA provides that EPA may delegate responsibility for implementation and enforcement of SDWA drinking water regulations in lieu of EPA to States that meet the minimum Federal requirements for the stringency of their regulations and the adequacy of their enforcement procedures.
- States and Tribes are required to meet these requirements in order to obtain ***primary enforcement authority ("primacy")*** for the PWSS or UIC program. The Sole Source Aquifer program is not a regulatory program and is not available for delegation.
  - SDWA allows the Administrator to treat Tribes as States.
  - SDWA also defines the District of Columbia, Guam, Puerto Rico, the Northern Mariana Islands, the Virgin Islands, American Samoa, and the Trust Territory of the Pacific Islands as States for purposes of primacy.
- Primacy is a status that must be maintained. As EPA promulgates new regulations, primacy States must adopt the new requirements under State law and apply for primacy for those requirements.
- In States without primacy, EPA has primary enforcement authority. These States are called "Direct Implementation" or DI States because EPA directly implements the UIC and PWSS programs in those States.
- The approach taken in the SDWA is consistent with the approach taken in the Federal Water Pollution Control Act of 1972 (now called the Clean Water Act). This Act gave EPA authority to set standards for Publicly Owned Treatment Works and industrial facilities that discharge into surface waters. (Discharges to ground water are not addressed in the Clean Water Act.) The Clean Water Act also set requirements for State water quality programs.



- The two major Federal statutes governing water are the Safe Drinking Water Act (SDWA) and the Clean Water Act (CWA).
- In general terms, the SDWA addresses drinking water, discharges to ground water, and the water systems that deliver drinking water to the public.
- The CWA is the counterpart to the SDWA. It regulates wastewater discharges, supports the creation and rehabilitation of wastewater treatment plants, and protects surface water.
- Some overlap obviously exists between these two statutes. However, as a basic rule, the SDWA is concerned with public health associated with safe drinking water while the CWA has a broader goal of clean, fishable, and swimmable waters.
- EPA's Office of Water (OW) implements these statutes.
  - The Office of Ground Water and Drinking Water (OGWDW) implements the SDWA.
  - The CWA is implemented by other offices in OW, including the Office of Wastewater Management (OWM), and the Office of Wetlands and Watersheds (OWOW).
  - The Office of Science and Technology (OST) in OW deals with the science related to both the CWA and the SDWA.



- OGWDW consists of two divisions: the ***Standards and Risk Management Division*** and the ***Implementation and Assistance Division***.
  - The ***Standards and Risk Management Division*** is responsible for setting drinking water standards and monitoring requirements, establishing priorities for new standards, and researching technologies that water systems can use to comply with new and existing standards.
    - Part of the Standards Division is the ***Technical Support Center***. The Technical Support Center provides technical and scientific support to the development and implementation of drinking water regulations, manages implementation of the Information Collection Rule, manages the drinking water laboratory certification program, and supports the Partnership for Safe Water, treatment plant optimization and analytical methods development.
  - The ***Implementation and Assistance Division*** oversees implementation of SDWA regulations through the Public Water System Supervision Program and the Underground Injection Program. It is also responsible for the Source Protection Programs.
- Other EPA Offices also have responsibilities for implementing SDWA:
  - The Office of Enforcement and Compliance Assistance enforces the statute and regulations;
  - The Office of Research and Development is responsible for research related to health risk assessment, health effects, engineering and technology, monitoring, and quality assurance for drinking water issues; and
  - The ten Regional Offices implement the programs in DI States and provide liaison, coordination and oversight of the States.

Introduction to the Regulated and Protected Entities

Source Water Protection

Underground Injection Control

Public Water System Supervision

- The goal of SDWA is to ensure that water is protected “from source to tap.” Thus:
    - It ***protects the sources*** of our drinking water, both ground and surface water;
    - It additionally protects underground sources of drinking water by ***regulating underground injection wells***; and
    - It ***regulates the facilities*** that treat, store and distribute drinking water to our taps.